(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 31 December 2003 (31.12.2003)

PCT

(10) International Publication Number WO 2004/001824 A1

(51) International Patent Classification7: 29/788, 21/8247, 27/115

H01L 21/28,

(21) International Application Number:

PCT/IB2003/002738

(22) International Filing Date:

12 June 2003 (12.06.2003)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data: 02077452.7

20 June 2002 (20.06.2002) EP

- (71) Applicant (for all designated States except US): KONIN-KLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): HENDRIKS, Antonius, M., P., J. [NL/NL]; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). GUELEN, Josephus, F., A., M. [NL/NL]; Prof . Holstlaan 6, NL-5656 AA Eindhoven (NL). DORMANS, Guido, J., M. [NL/NL]; Prof . Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (74) Agent: DULIVESTLIN, Adrianus, J.; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

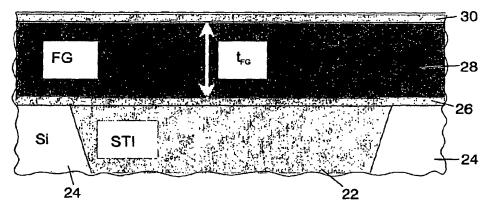
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, Π , IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CONDUCTIVE SPACERS EXTENDED FLOATING GATES



(57) Abstract: A method for manufacturing on a substrate (24) a semiconductor device with improved floating-gate to control-gate coupling ratio is described. The method comprises the steps of first forming an isolation zone (22) in the substrate (24), thereafter forming the floating gate (28) on the substrate (24), thereafter extending the floating gate (28) using polysilicon spacers (40), and thereafter forming the control gate (44) over the floating gate (28) and the polysilicon spacers (40). Such a semiconductor device may be used in flash memory cells or EEPROMs.